Present, *Control* = *Present*. The obtained results are: $Imp\_Time = 0.74$ (Important), $Imp\_Production = 0.728$ (Important). The decisions are ranked as follows: $bc(U = 1.07286)$, $te(U = 0.43610)$, $bo(U = 0.43188)$. The action *bc* is the best one (in this case, the user obtains a good 6 omelette without a cup to wash). The decision *te* is somewhat better than *bo* because the *Time criterion* is lightly higher than *Production* (namely, ensuring the less waiting time for the clients is more important than produce the maximum omelette for the restaurant in this case).

2. **Case 2 (see Figure 5):** The observations concerning OF and HF are the same in case 1, but $State\_Egg = rotten$. We observe that the decision *bc* is the most risky (negative utility) .

5. Conclusion

In this paper, we presented an approach for decision analysis focusing on a Benefit-Cost-Deficit (BCD) model. The model allows to analyse and evaluate the consequences of the intentional deviated human behaviour. To build the model based on the BCD approach, we proposed a graphical representation using an influence diagram. We proposed to take into account the context of the decision by introducing different factors that influence the users in their actions (as organizational and human factors). Including such factors is important, namely for evaluation the consequences (negative or positive). In addition, the fact that the analysis of the decision is done in terms of Benefit, Cost and Deficit, this allows to improve the prescribed behaviour in terms of means, rules and informing the users about the failures that some decisions can cause in the system (namely, when the safety is the important one). So, such approach is important, namely for risk analysis. Concerning future work, it may be interesting to get another evaluation of Benefit, cost and deficit in terms of fuzzy set approach and possibility theory, namely in order to represent the ignorance about the consequences of the deviated behaviour. We are also interested to apply this approach on an example of the use of an industrial rotary press. In this problem, deviations between the prescribed operational use and the operational use from users are possible. These deviations can affect the safety, quality or production objectives of the machine. The rotary press can pose many hazardous conditions for the users, such as burns, cuts or falls, excessive noise, intoxication. Moreover, production losses are rapidly increasing when the rotary press is not operating well. Different incidents can disturb the production: breaking of the printing plate, over-tightening of the screw that provides ink, etc.

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References

[1] J. Wiley, editor. *Influence Diagrams, Belief Nets and Decision Analysis*, R. M. Oliver and J. Q. Smith, 1999.

[2] UCL Press, editors. *An Introduction to Bayesian Networks*, Jensen, Finn V. 1996.

[3] John Wiley & Sons editor. *The Foundations of Statistics*, Leonard Jimmie Savage, New York 1954.

[4] John Wiley & Sons editor. *Games and Decisions*. R. D. Luce and H. Raiffa, 1957.

[5] Princeton University Press. *Theory of games and economic behavior*, von Neumann, J. and Morgenstern, O., Princeton, N.J., 1947.

[6] D. Guyonnet, B. Bourgine, D. Dubois, H. Fargier, Bernard CÃ´me, J.-P. ChilÃ¨s. *Hybrid Approach for Addressing Uncertainty in Risk Assessments.* Journal of Environmental Engineering 129(1): 68-78, 2003.

[7] Polet, P. and F. Vanderhaegen and P. Millot and P.A. Wieringa, Barriers and risk analysis. In *Symposium on Analysis Design and Evaluation of Human Machine Systems*, 2001.

[8] E. Hollnagel, Accident and barriers. In *Proceedings of 7th European Conference on Cognitive Science Approaches to Process Control*, pages 175–180, France, 1999.

[9] Pierlot, S., Y. Dien and M. Llory (2007). From organizational factors to an organizational diagnosis of the safety. *ESREL*, 2, 1329-1335, 2007.

[10] Trucco P., Di Giulio A., Randazzo G., Pedrali M. Towards a systematic organisational analysis for improving safety assessment of the maritime transport system, in safety and reliability, Bedford & Van Gelder (eds), pp. 513-521, ESREL, 2003.

[11] Léger, A. and R. Farret and C. Duval and E. Levrat and P. Weber and B. Lung, A safety barriers-based approach for the risk analysis of socio-technical systems, in *Seventeenth IFAC Word Congress*, Séoul, Corée du Sud, 2008.

[12] J. March. (ed.) (1987), Handbook of organizations. New York, Garland Pub.

[13] Ari Riabacke. Managerial Decision Making Under Risk and Uncertainty.*IAENG International Journal of Computer Science, 32:4, 2006.*

[14] Hélène Fargier et Régis Sabbadin. *Qualitative decision under uncertainty : back to expected utility.* Journal of Artificial Intelligence, 164 :245–280, 2005.